

CLAIMS:

1. A producing process of a sterile plant, comprising causing a plant to produce a chimeric protein, in which a transcription factor that promotes expression of a gene associated with formation of floral organs is fused with a functional peptide that converts an arbitrary transcription factor into a transcription repressor, so as to sterilize the plant.

2. A producing process of a sterile plant, comprising causing a plant to produce a chimeric protein, in which a transcription factor that promotes expression of a gene associated with formation of floral organs is fused with a functional peptide that converts an arbitrary transcription factor into a transcription repressor, so as to suppress expression of the gene associated with formation of floral organs.

3. A producing process of a sterile plant as set forth in claim 1, wherein the transcription factor that promotes expression of a gene associated with formation of floral organs is a transcription factor associated with formation of stamen or pistil.

4. A producing process of a sterile plant as set forth in any one of claims 1 through 3, wherein at least formation of stamen is suppressed in the sterile plant.

5. A producing process of a sterile plant as set forth in claim 3, wherein the transcription factor associated with formation of stamen or pistil is a transcription factor that promotes transcription of a gene associated with dehiscence of anther, and wherein a chimeric protein in which the

transcription factor is fused with a functional peptide that converts an arbitrary transcription factor into a transcription repressor is produced in a plant so as to suppress dehiscence of anther.

6. A producing process of a sterile plant as set forth in claim 5, wherein the transcription factor that promotes transcription of a gene associated with dehiscence of anther is a transcription factor with an MYB domain, and wherein a chimeric protein in which the transcription factor is fused with a functional peptide that converts an arbitrary transcription factor into a transcription repressor is produced in a plant so as to suppress transcription of the gene associated with dehiscence of anther.

7. A producing process of a sterile plant as set forth in claim 5 or 6, wherein the plant has sterile female organs.

8. A producing process of a sterile plant as set forth in any one of claims 5 through 7, wherein the plant produces sterile pollens.

9. A producing process of a sterile plant, comprising causing a plant to produce a chimeric protein, in which a transcription factor associated with formation of stamen and pistil is fused with a functional peptide that converts an arbitrary transcription factor into a transcription repressor, so as to produce a double-flowered plant.

10. A producing process of a sterile plant as set forth in any one of claims 1 through 4, comprising a transforming step of introducing into plant cells a recombinant expression vector

that includes a chimeric gene containing (i) a coding gene of the transcription factor and (ii) a polynucleotide that encodes the functional peptide.

11. A producing process of a sterile plant as set forth in claim 10, further comprising an expression vector constructing step of constructing the recombinant expression vector.

12. A producing process of a sterile plant as set forth in any one of claims 1, 3, and 5 through 8, comprising a transforming step of introducing into plant cells a recombinant expression vector that includes a chimeric gene containing (i) a coding gene of the transcription factor and (ii) a polynucleotide that encodes the functional peptide.

13. A producing process of a sterile plant as set forth in claim 12, further comprising an expression vector constructing step of constructing the recombinant expression vector.

14. A producing process of a sterile plant as set forth in any one of claims 1, 3, and 9, comprising a transforming step of introducing into plant cells a recombinant expression vector that includes a chimeric gene containing (i) a coding gene of the transcription factor and (ii) a polynucleotide that encodes the functional peptide.

15. A producing process of a sterile plant as set forth in claim 14, further comprising an expression vector constructing step of constructing the recombinant expression vector.

16. A producing process of a sterile plant as set forth in any one of claims 1 through 4, 10, and 11, wherein the

transcription factor is:

- (e) a protein with an amino acid sequence represented by SEQ ID NO: 134, or
- (f) a protein with the substitution, deletion, insertion, and/or addition of one to several amino acids in the amino acid sequence represented by SEQ ID NO: 134, and capable of promoting expression of the gene associated with formation of floral organs.

17. A producing process of a sterile plant as set forth in claim 10 or 11, wherein the coding gene of the transcription factor is:

- (e) a gene that has a base sequence of SEQ ID NO: 135 as an open reading frame; or
- (f) a gene that hybridizes under stringent conditions with a gene of a base sequence complementary to the gene of the base sequence represented by SEQ ID NO: 135, and that encodes the transcription factor that promotes expression of the gene associated with formation of floral organs.

18. A producing process of a sterile plant as set forth in any one of claims 1, 3, 5, 7, 8, 12, and 13, wherein the transcription factor is:

- (a) a protein with an amino acid sequence represented by SEQ ID NO: 136; or
- (b) a protein with the substitution, deletion, insertion, and/or addition of one to several amino acids in the amino acid sequence represented by SEQ ID NO: 136, and capable of promoting transcription of a gene associated with dehiscence of anther.

19. A producing process of a sterile plant as set forth in any one of claims 1, 3, 5, 7, 8, 12, and 13, wherein the transcription factor shares 50% or greater homology with the amino acid sequence of SEQ ID NO: 136, and is a protein capable of promoting transcription of a gene associated with dehiscence of anther.

20. A producing process of a sterile plant as set forth in claim 12 or 13, wherein the coding gene of the transcription factor is:

- (c) a gene that has a base sequence of SEQ ID NO: 137 as an open reading frame; or
- (d) a gene that hybridizes under stringent conditions with a gene of a base sequence complementary to the gene of the base sequence represented by SEQ ID NO: 137, and that encodes a transcription factor that promotes transcription of a gene associated with dehiscence of anther.

21. A producing process of a sterile plant as set forth in any one of claims 1, 3, 6 through 8, 12, and 13, wherein the transcription factor is:

- (a) a protein with an amino acid sequence represented by SEQ ID NO: 138; or
- (b) a protein with the substitution, deletion, insertion, and/or addition of one to several amino acids in the amino acid sequence represented by SEQ ID NO: 138, and capable to promoting transcription of a gene associated with dehiscence of anther.

22. A producing process of a sterile plant as set forth in claim 12 or 13, wherein the coding gene of the protein is:

- (c) a gene that has a base sequence of SEQ ID NO: 139 as an open reading frame; or
- (d) a gene that hybridizes under stringent conditions with a gene of a base sequence complementary to the gene of the base sequence represented by SEQ ID NO: 139, and that encodes a transcription factor that promotes transcription of a gene associated with dehiscence of anther.

23. A producing process of a sterile plant as set forth in any one of claims 1, 3, 9, 14 and 15, wherein the transcription factor is:

- (a) a protein with an amino acid sequence represented by SEQ ID NO: 140; or
- (b) a protein with the substitution, deletion, insertion, and/or addition of one to several amino acids in the amino acid sequence represented by SEQ ID NO: 140.

24. A producing process of a sterile plant as set forth in claim 14 or 15, wherein the coding gene of the transcription factor is:

- (c) a gene that has a base sequence of SEQ ID NO: 141 as an open reading frame; or
- (d) a gene that hybridizes under stringent conditions with a gene of a base sequence complementary to the gene of the base sequence represented by SEQ ID NO: 141, and that encodes a protein associated with

formation of stamen and pistil.

25. A producing process of a sterile plant,
said process using a gene that encodes:

- (a) a protein with an amino acid sequence represented by SEQ ID NO: 136; or
- (b) a protein with the substitution, deletion, insertion, and/or addition of one to several amino acids in the amino acid sequence represented by SEQ ID NO: 136, and capable to promoting transcription of a gene associated with dehiscence of anther, or

said process using:

- (c) a gene that has a base sequence of SEQ ID NO: 137 as an open reading frame; or
- (d) a gene that hybridizes under stringent conditions with a gene of a base sequence complementary to the gene of the base sequence represented by SEQ ID NO: 137.

26. A producing process of a sterile plant as set forth in any one of claims 1 through 25, wherein the functional peptide has an amino acid sequence represented by one of:

- (1) X1-Leu-Asp-Leu-X2-Leu-X3, where X1 represents 0 to 10 amino acid residues, X2 represents Asn or Glu, and X3 represents at least 6 amino acid residues;
- (2) Y1-Phe-Asp-Leu-Asn-Y2-Y3, where Y1 represents 0 to 10 amino acid residues, Y2 represents Phe or Ile, and Y3 represents at least 6 amino acid residues;
- (3) Z1-Asp-Leu-Z2-Leu-Arg-Leu-Z3, where Z1

- represents Leu, Asp-Leu, or Leu-Asp-Leu, Z2 represents Glu, Gln, or Asp, and Z3 represents 0 to 10 amino acid residues; and
- (4) Asp-Leu-Z4-Leu-Arg-Leu, where Z4 is Glu, Gln, or Asp.

27. A producing process of a sterile plant as set forth in any one of claims 1 through 25, wherein the functional peptide has an amino acid sequence represented by any one of SEQ ID NO: 1 through 17.

28. A producing process of a sterile plant, wherein the functional peptide is:

- (e) a peptide with an amino acid sequence represented by SEQ ID NO: 18 or 19; or
- (f) a peptide with the substitution, deletion, insertion, and/or addition of one to several amino acids in the amino acid sequence represented by SEQ ID NO: 18 or 19.

29. A producing process of a sterile plant as set forth in any one of claim 1 through 25, wherein the functional peptide has an amino acid sequence represented by:

$\alpha 1$ -Leu- $\beta 1$ -Leu- $\gamma 1$ -Leu ... (5)

where $\alpha 1$ is Asp, Asn, Glu, Gln, Thr, or Ser, $\beta 1$ is Asp, Gln, Asn, Arg, Glu, Thr, Ser, or His, and $\gamma 1$ is Arg, Gln, Asn, Thr, Ser, His, Lys, or Asp.

30. A producing process of a sterile plant as set forth in any one of claim 1 through 25, wherein the functional peptide has an amino acid sequence represented by:

$\alpha 1$ -Leu- $\beta 1$ -Leu- $\gamma 2$ -Leu ... (6)

$\alpha 1$ -Leu- $\beta 2$ -Leu-Arg-Leu ... (7)

$\alpha 2$ -Leu- $\beta 1$ -Leu-Arg-Leu ... (8)

where $\alpha 1$ is Asp, Asn, Glu, Gln, Thr, or Ser, $\alpha 2$ is Asn, Glu, Gln, Thr, or Ser, $\beta 1$ is Asp, Gln, Asn, Arg, Glu, Thr, Ser, or His, $\beta 2$ is Asn, Arg, Thr, Ser, or His, and $\gamma 2$ is Gln, Asn, Thr, Ser, His, Lys, or Asp.

31. A producing process of a sterile plant as set forth in any one of claims 1 through 25, wherein the functional peptide is a peptide with an amino acid sequence represented by SEQ ID NO: 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 38, 39, 40, or 152.

32. A producing process of a sterile plant as set forth in any one of claims 1 through 25, wherein the functional peptide is a peptide with an amino acid sequence represented by SEQ ID NO: 36 or 37.

33. A sterile plant, which is produced by the producing process of any one of claims 1 through 32.

34. A sterile plant as set forth in claim 33, wherein the sterile plant includes at least one of: an adult plant; a plant cell; a plant tissue; a callus; and a seed.

35. A sterile plant producing kit for performing the producing process of any one of claims 1 through 32, said kit comprising a recombinant expression vector that includes:

a gene that encodes a transcription factor that promotes expression of a gene associated with formation of floral organs, formation of stamen or pistil, dehiscence of anther, or formation of stamen and pistil;

a polynucleotide that encodes a functional peptide that converts an arbitrary transcription factor into a transcription repressor; and
a promoter.

36. A sterile plant producing kit as set forth in claim 35, further comprising chemicals for introducing the recombinant expression vector into plant cells.

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CLAIMS:

1. (Amended) A producing process of a sterile plant, comprising causing a plant to produce a chimeric protein, in which a transcription factor that promotes expression of a gene associated with formation of floral organs is fused with a functional peptide that converts an arbitrary transcription factor into a transcription repressor, so that the chimeric protein suppresses transcription of the gene associated with formation of floral organs and thereby sterilize the plant.

2. (Amended) A producing process of a sterile plant, comprising causing a plant to produce a chimeric protein, in which a transcription factor that promotes expression of a gene associated with formation of floral organs is fused with a functional peptide that converts an arbitrary transcription factor into a transcription repressor, so that the chimeric protein suppresses transcription of the gene associated with formation of floral organs and thereby changes flower morphology.

3. A producing process of a sterile plant as set forth in claim 1, wherein the transcription factor that promotes expression of a gene associated with formation of floral organs is a transcription factor associated with formation of stamen or pistil.

4. A producing process of a sterile plant as set forth in any one of claims 1 through 3, wherein at least formation of stamen is suppressed in the sterile plant.

5. A producing process of a sterile plant as set forth in claim 3, wherein the transcription factor associated with

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formation of stamen or pistil is a transcription factor that promotes transcription of a gene associated with dehiscence of anther, and wherein a chimeric protein in which the